

APR -24

### Carcass Characteristics and Organ Weight of Broiler Chickens Fed Graded Levels of Tannia (*Xanthosoma sagittifolium*) In Place of Maize

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#### Abstract

Carcass characteristics and organ weights of broiler chickens fed graded levels of Tannia (*Xanthosoma sagittifolium*) cocoyam was investigated using 120 Arbor-acre strain broiler chickens. They were randomly assigned to 4 dietary treatment groups with 3 replicates and 10 birds per replicate in a completely randomized design (CRD). Diet 1 was maize based and served as control diet. The test ingredient replaced maize at 10%, 20% and 30% in diets 2, 3 and 4 respectively. Water and feed were offered *ad-libitum* for a period of 56 days. The proximate composition of test ingredient were as follows: Crude fibre (6.00%), Crude protein (6.725%), Ash (5.00), Moisture (9.00%), ether extract (0.33%), NFE (72.95%). The anti-nutritional factors of the test ingredient were as follows: phytate (0.02%), Oxalate (0.01%) and Hydrogen cyanide (11.2 mg/kg). The cut parts results revealed significant differences ( $p<0.05$ ) for thigh and back cut only. The value for thigh and back cut were in favour of Diet 1 among other treatment means. The internal organ weights results showed significant differences ( $p<0.05$ ) for all parameters measured except heart, liver, proventriculus and gizzard. Considering the highest value of the thigh (prime part) that was significantly ( $p<0.05$ ) higher than all other diets, higher value of back cut and comparable values for organ weights, Diet 1 seems to be superior to others and hence, Tannia cocoyam (*Xanthosoma sagittifolium*) cannot replace maize even at 10% dietary level of inclusion as far as cut parts and organ weights is concerned.

**Keywords:** *xanthosoma sagittifolium*, carcass, organ, broiler chickens, maize

#### Introduction

Tannia is a food crop grown in the tropics; it contains 15-39% of carbohydrate, 5.6% crude protein, 4.5% crude fibre with a metabolizable energy of 3272kcal/kg. Presence of anti-nutritional factors such as oxalate, tannin, cyanide and phytate has been reported in cocoyam (Akinmutimi *et al.*, 2011). This call for detoxification, sun drying is a common and acceptable means of detoxification in Nigeria. Of importance to Animal Nutritionists apart from growth performance are carcass quality and organ weight. The dietary level of *Xanthosoma sagittifolium* meal that will enhance good performance of carcass quality and organ weights is yet to be reported. In this study, the carcass characteristics and organ weights of broiler chickens fed graded levels of Tannia (*Xanthosoma sagittifolium*) cocoyam was investigated.

#### Materials and methods

The study was carried out at the poultry unit of the Teaching and Research Farm of Michael Okpara University of Agriculture, Umudike, Abia State, Nigeria. A total of one hundred and fifty day old chicks were purchased in which 120 were selected after 1 week of brooding and assigned to 4 dietary treatments. Each treatment had 3 replicates of 10 birds per replicate in a completely randomized design. The experiment lasted for 56 days. The birds were managed in a deep litter system and wood shavings were used. Water and feed were given *ad-libitum*. The birds were provided with heat during the brooding stage. Drugs, vaccines and energy boosters like vitalyte extra were given to the birds. The test feed stuff (Tannia) were collected from Akwa Ibom market and Umudike areas, harvested, cleaned of sand, peeled, chopped, sun dried, milled and used for chemical analysis and ration formulation.

Four diets were formulated. Diet 1 was the control and contained 0% test feed stuff. Diets 2, 3 and 4 contained 5%, 10% and 15% dietary level of inclusion of Tannia meal in replacement of maize as shown in Table1. The proximate composition of the test ingredient and the experimental diets were determined using the procedure of A.O.A.C (1990). The anti-nutritional factors as tannins (Maga, 1982); phytate (Lucas and Markaka, 1975; Brunner, 1984) and oxalate (Murno, 2000).

Table 1: Ingredient composition of experimental diets

Ingredients	Diets			
	D1	D2	D3	D4
Maize	50	45	40	35
Tannia meal	0	5	10	15
Soyabean meal	33	33	33	33
Palm kernel cake	10.5	10.5	10.5	10.5
Bone meal	3	3	3	3
Fish meal	3	3	3	3
Salt	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Total	100	100	100	100
Calculated Nutrients				
Crude protein %	22.01	21.79	21.57	21.35
Crude fibre %	4.44	4.57	4.69	4.82
ME Kcal/kg	2905.20	2898.90	2892.4	2886.00

Three birds each closest to the mean live weight were selected from each treatment. The birds were fasted for 12 hours before slaughter to ensure good meat quality. They were slaughtered by severing the jugular vein to ensure proper bleeding and thereafter defeathered by scalding in hot water. The neck, shank and viscera were removed to determine dress weight. The cut parts (breast, thigh, drumstick, wings and back) and organs (liver, heart, etc.) were obtained using the dissection procedures described by Ojewola (2009). They were expressed as percentage dressed weight and live weights respectively.

Data collected were subjected to analysis of variance in accordance with Steel and Torrie (1980) and significant means were separated using Duncan's Multiple Range Test (Duncan, 1955).

### Results and Discussions

The proximate composition of the experimental diet is as shown in Table 2. The crude protein determined ranged from 20.86 to 21.80% is closely related to the calculated values and in line with the nutrient requirement of broiler chickens fed straight diet with the exception of the diet 4 which is a bit lower than normal. The lower value could probably be attributed to quantitative replacement of maize with cocoyam (Akinmutimi, 2004). The crude protein content of 6.72% obtained in this result falls within the range of values obtained by other research workers (Abdulrashid and Agwunobi, 2012 and Yahaya *et al.*, 2013). The high value of NFE obtained for the test feedstuff implies higher digestible nutrient (Maynard *et al.*, 1979 and Akinmutimi, 2004).

Table 2: Proximate composition of experimental diet

Determined composition %	Diets			
	D1	D2	D3	D4
Moisture	8.00	8.00	8.20	8.50
Ash	7.50	8.50	8.92	9.50
Crude protein	21.80	21.50	21.04	20.86
Crude fibre	3.50	4.26	4.35	4.58
Ether extract	1.66	1.66	1.65	1.67
NFE	57.54	56.08	55.84	54.89

Table 3: Proximate composition of the test ingredient

Moisture %	Ash %	Crude protein %	Crude fibre %	Fat %	NFE
9.00	5.00	6.72	6.00	0.33	72.95

Table 4: Anti-nutritional factors in the test ingredient

HCN (mg/kg)	% phytate	% oxalate
11.28	0.02	0.01

They are hydrogen cyanide, oxalate and phytate among which hydrogen cyanide seems to have the highest value. The above result confirmed the report of other workers who reported that Tannia contains the above anti-

nutritional factor (Aletor and Fasuyi 1997 and Akinmutimi *et al.*, 2011). There were significant differences ( $P<0.05$ ) for the thigh and back cut only. The thigh value shows that diet 1 (control diet) had the highest value that was significantly higher ( $p<0.05$ ) than the test diets. The test diets were statistically similar ( $p<0.05$ ), this implies that the control diet supports tissue deposition for thighs than other diets. The back cut value decreased as the dietary level of inclusion of the test feed stuff increased and it became significantly different from Diet 3 and above. This implies that for back cut also Diet 1 seems to be more superior to other diets and hence recommended for cut part.

Table 5. Cut part of broiler chickens fed graded levels of Tannia cocoyam expressed as percentage of dressed weight

Parameters	Diets				SEM
	D1	D2	D3	D4	
% Dressed weight	56.75	56.17	54.77	62.15	2.22
Thigh	18.26 <sup>a</sup>	16.07 <sup>b</sup>	14.26 <sup>b</sup>	15.81 <sup>b</sup>	0.63
Drumstick	16.18	16.13	15.71	15.89	0.41
Breast cut	28.99	30.22	29.96	37.54	3.28
Back cut	29.21 <sup>a</sup>	24.14 <sup>ab</sup>	19.46 <sup>b</sup>	20.16 <sup>b</sup>	1.62
Wings	15.35	14.74	15.12	14.50	0.46

<sup>a-d</sup> treatment means in the same row with different superscripts are significantly different ( $p<0.05$ )

Table 6 reveals the organ weight (expressed as % of dressed weight of broiler chickens fed graded levels of Tannia cocoyam. There were significant difference ( $p<0.05$ ) for all the parameters measured except heart, liver, proventriculus, and gizzard. The values of intestine, spleen, lungs and kidney did not follow any pattern that could be attributed to the effects of the test ingredients. This implies that any of the diet could be a choice diet.

Table 6. Organ weights of broiler chickens fed graded levels of Tannia cocoyam expressed as % of dressed weight

Parameters%	Diets				SEM
	D1	D2	D3	D4	
Heart	0.34	0.37	0.32	0.41	0
Liver	2.38	0.37	0.32	0.41	0.2
Intestine	4.77 <sup>ab</sup>	5.17 <sup>ab</sup>	5.53 <sup>a</sup>	4.54 <sup>b</sup>	0.24
Proventriculus	0.4	0.38	0.4	0.37	0
Gizzard	0.221	2.45	2.21	2.41	0.1
Spleen	0.11 <sup>ab</sup>	0.1 <sup>ab</sup>	0.70 <sup>b</sup>	0.12 <sup>a</sup>	0
Kidney	0.69 <sup>b</sup>	0.69 <sup>b</sup>	0.62 <sup>c</sup>	0.78 <sup>a</sup>	0
Lungs	0.42 <sup>ab</sup>	0.27 <sup>b</sup>	0.52 <sup>a</sup>	0.52 <sup>a</sup>	0.2

<sup>a-c</sup> treatment means in the same row with different superscripts are significantly different.

### Conclusion

Conclusively, considering the highest value of thigh (prime parts) that was significantly higher ( $P<0.05$ ) than all other diets and higher value of back cut and comparable value for organ weights, diet 1 seems to be more superior to others and therefore Tannia cocoyam cannot replace maize even at 10% dietary level of inclusion as far as cut parts and organ weights are concerned.

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